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THE MARGINAL PRODUCTIVITY VERSUS THE IMPATIENCE THEORY OF INTEREST

SUMMARY (by Sections)

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SECTION 1

THE marginal productivity theory of interest is based in part on the idea of greater productiveness of the roundabout method of production. Capitalistic production is but another name for roundabout or indirect production. Instead of making shoes directly we first make machinery and then use this machinery to make the shoes. This means an interval, a period of waiting, between the first application of labor and its desired result. It is production by the intermediate use of capital; therefore indirect or roundabout production. It yields generally a larger result, since those

indirect processes of production which do not yield a larger result are not intentionally adopted. In large part our methods of increasing the total product of industry, involve a further use of machinery and therefore an extension of the indirect method.

But the superior efficiency of indirect production is greater or less according to how far it is carried.¹ In any given stage of the arts, that machinery would first be produced which would most largely add to the efficiency of labor. Later would be constructed machinery which could increase the efficiency of labor to a less degree. Such an increase of machinery, as well, of course, as various other additions to capital equipment, would mean that labor applied directly must become more efficient and profitable, since it has thus secured a better equipment of tools, machinery, roads, buildings, and other capital to use. The conclusion is that the greater the extent to which the indirect method is applied, *i. e.*, the more largely we produce desired consumption goods by first producing capital, the less advantage do we get from a still further extension of indirect production. We may, perhaps, even conceive the possibility of extending indirect production to such a point that returns are actually less than they would else be; time is spent in constructing relatively unnecessary capital equipment when it might better be spent in directly producing, with the aid of the already existing equipment, a larger supply of finished or consumption goods. In practice, however, there appears to be an indefinite field for the extension of indirect production with continuing advantage

¹ The marginal productivity theory as stated in the first part of this article, is believed to be, in essentials, the theory presented by such writers as J. B. Clark, T. N. Carver, H. R. Seager, F. W. Taussig, G. Cassel, and others.

Böhm-Bawerk's theory of the technical superiority of present goods is also, of course, a productivity theory.

from such extension.¹ One has but to think how many public and private improvements would be worth while and how much time might profitably be spent in invention, if a yield of one-fourth per cent a year were sufficient return, to realize that indirect production could be much further extended, could we afford to wait, with larger ultimate income as a reward.

At the line or margin where indirect production is stopped, its result, still superior to that of direct production, may be said to be the marginal product of capital or of the roundabout productive process; or, since indirect production differs from direct in that it requires waiting, we may term the surplus so yielded over what the same labor would yield if directly applied, the marginal product of waiting. Thus, if a given amount of labor can yield an immediate product of 100 or can, by being stored in capital, yield a product one year later of 110, then the surplus product, 10, may be spoken of as the marginal product of "waiting." If we measure waiting by amount of gratification postponed and duration of postponement,² we may say that the marginal product of waiting is, in this case, 10 per cent.

But it is not clear without further analysis that interest on invested capital will be 10 per cent, that for a present investment of 100, a capitalist can get a return, at the end of a year, of 110. To assert this is to assume that the labor hired to begin the indirect production will receive only 100, *i. e.*, the amount which this labor could produce by the direct method, altho the ultimate product by the indirect method, at the end of the year, is greater than this by 10. But why assume that wages are equivalent only to what

¹ Cf. G. Cassel, *The Nature and Necessity of Interest*, London (Macmillan), 1903, pp. 108, 109.

² Suggested by G. Cassel, *The Nature and Necessity of Interest*, p. 42.

labor can produce by the direct method? Why may not competition for labor services which will yield 110 at the end of a year, make the wages received, 105 at the beginning of the year even if the direct product is only 100, and make interest, therefore, less than 10 per cent? Wages and the capital produced by labor are said to be worth the discounted value of the future expected satisfactions. Why must the rate of discount, and its converse, the rate of interest, be determined to any extent by the marginal productivity of waiting?

It is not intended to assert that the explanations currently given are incorrect. The writer is convinced that the marginal productivity theorists are right in their contention, and that the superior efficiency of indirect production has a most important influence on the rate of interest. But it is believed that the relation between the two has been, by most writers, incompletely analyzed, and that the spread of an "impatience" theory which refuses to admit productivity as an independent direct cause of interest, has thus been made possible. This impatience or time preference theory of interest, as presented by Professor Fisher in his *Rate of Interest*, is at fault, in the opinion of the present writer, because it makes all determining influences, including productivity, act upon interest only by first acting upon impatience. It should be said that Professor Fisher does not ignore productivity as an influence upon interest, any more than modern productivity theorists ignore impatience. In fact, his book, *The Rate of Interest*, devotes not a few pages to a discussion of the influences exerted by the conditions of production upon interest, and vice versa. But altho the objective or productivity element is admitted, it is not admitted as a direct acting cause. Hence the theory may very properly be called the "impa-

tience " theory, *i. e.*, a theory which, as stated above, makes impatience the only influence acting *directly* on interest, and makes all other causes operate only *through* impatience. Thus, in criticizing Böhm-Bawerk, he states that ¹ " to abstract both the underestimate of the future and underprovision for the present is to abstract the *whole* basis for interest and not a part merely." And again, in continuing his criticism of the same author, he maintains that ² " the only way in which the existence of long processes of production acts on interest is by over-endowing the future and under-endowing the present, thus creating a ' scarcity value ' of present goods." This emphasis by Professor Fisher on impatience, as the universal immediate cause, together with the large omissions on the subject of interest, in his *Elementary Principles*, perhaps explains why his theory has apparently been somewhat misunderstood by so able a thinker and writer as Professor Seager, who has even gone so far as to assert that Professor Fisher entirely excludes productivity as a determining factor.³ The position taken by the present writer is, that productivity and impatience are coördinate determinants, *i. e.*, that productivity is as direct a determinant of interest as is impatience, and that productivity may be, in a modern community, the more important determinant.

SECTION 2

We have seen that roundabout production yields a surplus over direct production. By so doing it affects simultaneously the rate of interest and individual rates of impatience. We shall see, as we proceed, that

¹ The Rate of Interest, New York (Macmillan), 1907, p. 65.

² *Ibid.*, p. 72. See also pp. 186, 187 and 195, 196.

³ See Professor Seager's article, "The Impatience Theory of Interest," in the *American Economic Review*, December, 1912, p. 834.

it does not affect the former primarily by first determining the latter. To show how greatly the productivity of waiting can influence interest, let us assume that indirect production could be indefinitely extended without reducing the reward of marginal waiting below 10 per cent. Then the rate of interest could not be less than 10 per cent, nor could individual rates of impatience be less, and the marginal productivity of waiting might be said, in so far, to determine both. It determines interest by affecting both the demand and the supply sides of the market. It determines impatience by causing the adoption, to a considerable degree, of roundabout production, and therefore making present income relatively scarce and future income relatively abundant. Thus impatience is increased.¹

Putting the matter in terms of demand for and supply of present goods, we may say that if the indirect method would yield continuously, and even tho indefinitely extended, a 10 per cent surplus, then a rate of exchange of less than 110 of next year's goods for 100 of this year's would mean a demand for present goods in excess of the supply. On the demand side, if the marginal product of waiting is equal to 10, the possibility of getting 100 of present goods for 105 of next year's goods, would mean a greater demand for the present goods than if the marginal product of waiting were but 5. For all those classes of persons, *e. g.*, spendthrifts and necessitous persons such as laborers, who, in effect, habitually buy present goods with future, would have, with the higher assumed productivity of the roundabout method at which they are engaged or to which they can turn, more future goods to offer for present. At a rate of exchange of 105 future for 100 present, they would, in producing 110 future and buying 100 present,

¹ See Böhm-Bawerk, *Positive Theorie des Kapitals*, Dritte Auflage, Innsbruck, 1912, p. 468. Cf. Fisher, *The Rate of Interest*, New York (Macmillan), 1907, pp. 186, 187.

have 5 of future, *i. e.*, next year's goods, left over with which to demand more present goods; whereas if round-about production were only 5 per cent superior, this surplus demand for present goods could not exist. Thus, with a marginal productivity of waiting equal always to 10 per cent, necessitous wage earners, if they received 100 of present goods for every 105 of next year's goods produced by their work, might be said to demand more present goods than if the marginal productivity of waiting were only 5 per cent. For in the former case they still have a future product of 5, after getting 100 in present goods, for which surplus 5 they demand a further quantity of this year's goods. We may therefore assert that the higher is the marginal product of waiting and the more slowly this marginal product declines with increased quantity of waiting, the greater will be the demand, at any given price or value in future goods, for present goods. This is a use of the term "demand" analogous to its use in the theory of price and value. Unfortunately, economists are apt, in such discussions as the present, to use the terms "supply" and "demand" loosely and without careful analysis.

It should be observed that this greater demand for present goods, at a rate of 105 of next year's goods for 100 now, due to the 10 per cent superiority of indirect production, is not, necessarily, brought about through any effect on impatience. The greater demand for present goods at any rate of interest less than 10 per cent may be due directly to this superior productiveness of the capitalistic method, or, if we use Böhm-Bawerk's phrase, to the technical superiority of present goods. Let us suppose, for illustration, a man who must have 100 this year in order to maintain life. He does not possess it and if he cannot borrow it, will have to pro-

duce it. But if he can borrow it, he will then be in a position to turn his attention towards roundabout production, which, otherwise, he could not possibly do; and he will therefore be able to produce 110 a year later with the same labor required to produce 100 this year. Will he not, if interest is 5 per cent (or anything less than 10) be very glad to get 100 of present goods and so be able to produce 110 a year later? Yet this will not of necessity be due to his impatience. He may be a man who, were any other way possible of getting the 110 next year, would refuse to borrow 100 even at only one per cent interest. He may have so little impatience that even an income stream rising at such a rate as 10 per cent, would not induce him to seek present goods for future. He may have a zero rate of impatience, if not a negative one. If he borrows 100 for this year's use, in order that he may work hard at roundabout production when otherwise he would do an equal amount of work in securing 100 in this year's goods, it certainly cannot be said that he borrows in order to provide for present needs out of future abundance, for his present needs are *no better provided for* than if he did not borrow. He works just as hard and has this year no greater income. The fact is *that such a man does not borrow because he is impatient and wants more present income at the expense of his future*. In borrowing, he really is not comparing this year's 100 with next year's repayment of 105, for he could get this year's 100 for the work he is in any case doing. He is comparing the 110 which roundabout production will yield him next year, with the 105 of next year's goods (or anything less than 110) which he must pay for the 110. *He is comparing two futures, rather than a present and a future.*¹ He is going

¹ Cf. Böhm-Bawerk, *Positive Theorie des Kapitaless, Dritte Auflage*, 1912, Exkurse, pp. 406-409.

to have 100 this year whether he borrows or not. He is going to do a given amount of productive work this year whether he borrows or not. If he borrows he simply makes the difference between 110 and what he has to pay next year for the loan. In what possible sense can it be said that he borrows only because he is impatient ?

Here we see the fundamental error in Fisher's criticism of Böhm-Bawerk. Professor Böhm-Bawerk in his *Positive Theory of Capital*¹ has a series of tables illustrating the technical superiority of present goods, the point being that early goods are to be preferred to later because they make possible more roundabout production, *e. g.*, to use the figures of this article, that 100 this year is preferable to 100 next year, because 100 this year makes possible 110 next year, through the adoption of roundabout processes. Fisher's argument is, in effect,² that 100 now would be no better than 100 next year, if man were not impatient, because 100 next year would make possible 110 year after next; that as much would be enjoyed eventually, and so if one did not mind waiting, either option would be as good as the other. Professor Fisher's statement³ is that "the only reason anyone can prefer the product of a month's labor invested today to the product of a month's labor invested next year is that today's investment will mature earlier than next year's investment." In view of what has been said in the foregoing pages, it seems to the present writer, that this criticism really fails to meet the essential point of the argument. So long as 100 this year makes possible 110 next year, many persons will be very anxious to get the 100 pro-

¹ *The Positive Theory of Capital*, English Translation, London (Macmillan), 1891 pp. 262-269; Dritte Auflage, 456-466.

² *Rate of Interest*, pp. 58-71.

³ *Ibid.*, pp. 70, 71.

vided they do not have to pay back quite all of the 110. Their total income will be larger and not merely earlier because of such a choice. A proper comparison of the two options begins *with the present in both cases*, not, as Professor Fisher would have us believe, a year later in one case than in the other. In either case, income and work would begin with *this year*. In the one case the loan of 100 would make possible beginning the more productive indirect method at once. In the other case the first year would have to be spent in the use of the less productive direct method. All question of impatience aside, the first choice would be preferable to the second since it would yield during any given period, a greater total result.¹

Professor Fisher, in attempting to show that all loans are really made to provide present income for those who desire the loans, even if they are so-called productive loans, assumes the case of a business man who borrows to make an investment and who has the three options of not investing, and of making the investment by sacrificing part of his early income for the sake of later or by borrowing so as not to have to sacrifice early income.² But in our example above described, the borrower has but the first and third of these options. If he cannot borrow, he cannot invest, that is, he cannot choose roundabout production. It cannot be said, therefore, that he borrows to supply present needs, and it cannot be said that borrowing, in general, is necessarily a means of providing the present at the expense of the future, but that there really are, contrary to the viewpoint of Fisher,³ productive loans in the sense in which economists have

¹ See Böhm-Bawerk, *The Positive Theory of Capital*, English Translation, p. 271; Dritte Auflage, p. 469. See also Exkurse XII, in answer to Fisher's criticisms.

² Rate of Interest, pp. 246-251.

³ *Ibid.*, p. 251.

used that expression. Impatience is only one cause, and perhaps a minor cause, of this demand for present goods.

In concluding, now, our analysis of the demand side of the market in so far as it shows a tendency of productivity of waiting to keep interest up, may we not state a quantitative result? Assuming that the marginal productivity of waiting, however far extended, is 10 per cent, and that the supply of present or early goods is not unlimited, may we not assert that *at a rate of interest appreciably less than 10 per cent, the demand for present goods or relatively early goods, must exceed the supply?* For even those who are not by nature so *impatient* as to purchase present goods for future at that rate will nevertheless purchase present or comparatively early goods, that they may extend the amount or the time of indirect production and reap a gain in so doing.

SECTION 3

On the other hand, a high marginal productivity of capital or of waiting tends to decrease the supply of present goods, at any given price in terms of future goods. Thus, with the marginal productivity of indirect production 110, however far extended, as against 100 for direct, nobody would supply present goods at all if offered a price of only 105 in next year's goods for 100 present. If roundabout production yielded less, say 4 or 5 per cent, such an offer might bring out a supply of present goods. But with roundabout production yielding a 10 per cent yearly surplus, it would not be worth while for any one to produce present goods at all in order to make such an exchange. Rather than produce present goods to the amount of 100

and exchange or sell them for 105 of next year's goods, any producer would prefer to get, by the indirect method, 110 of next year's goods. We may put the matter in a somewhat different way if we first call attention to the fact that wages are paid, in the first instance, neither in present consumption goods nor yet in future goods (durable capital) but in general purchasing power. The amount that an employer has to pay in wages will, presumably, be the same whether he employs his men in direct or indirect production, in producing present or future goods. But if employing them in indirect production will yield 110, no employer is going to pay the same wages for present goods of 100, and then supply these goods for the equivalent of 105 in the goods of a year later. An employer will either receive for his 100 a purchasing power over 110 of next year's goods, or he will have next year's goods produced instead of present goods. It appears, therefore, that if indirect production can be indefinitely extended with a surplus return of 10 per cent, any appreciably less rate of interest than 10 per cent, would certainly mean a supply of present goods less than the demand. Therefore a rate of appreciably less than 10 per cent could not continue.

It is worth while calling attention again at this point to the fact that we are dealing here, as Böhm-Bawerk has claimed, with an independent cause of interest other than impatience. It is not, in our example, because those on the supply side of the market are impatient, that they will not dispose of 100 present goods for less than 110 of next year's goods. It is rather because nature or invention or, more properly, both, gives them the option of getting the 110 next year, through their own present efforts, if they will, instead of by lending or selling present goods for future.

Is a man impatient because he will not accept 105 of next year's goods when he may, by the same present effort, get 110? The choice is between a smaller future income and a larger, not between a present and a future income. How, therefore, can impatience be said to be involved as the cause? Impatience or time preference is a state of mind relating to present compared with future goods; not related to future compared with other future goods.

The above argument shows, it is believed, that productivity of capital has both a direct and a proportionate effect upon the rate of interest, if by productivity we here mean surplus productivity over direct production. To double the surplus productivity of any one instrument of capital would not, of course, appreciably affect the rate of interest, because it would mean but a slight change in the market conditions of supply and demand. The increased supply of products or uses would, if the capital were itself produced by labor, lower their price in relation to other goods, and no other effect would be noticed. But permanently to double the surplus productivity of capital in general, in other words to double the marginal product of waiting and to keep this marginal product, however great the increase of waiting, double what it has been, would, and must, not less than double the rate of interest. For if the surplus marginal productivity of capital were changed from 10 to 20 per cent, no one would any longer, however low his impatience, consent to lend or invest present goods for 10 per cent. Rather would he adopt indirect production and realize 20. His refusal to accept 10 would not be due, necessarily, to his impatience but directly to the fact that he has now a better option than before. The assertion that ¹

¹ Fisher, *The Rate of Interest*, p. 15.

“to raise the rate of interest by raising the productivity of capital is, therefore, like trying to raise one’s self by one’s own boot-straps,” hardly gives a true account of the situation even tho only a direct and not an indirect effect is denied. Neither is it convincing to state that ¹ “an increase of the productivity of capital would probably result in a decrease instead of an increase, of the rate of interest,” and that “to double the productivity of capital might more than double the value of the capital,” unless by productivity is meant productivity in general and not merely the surplus productivity of indirect production. As a matter of fact to double the surplus ² marginal product from 10 to 20 and keep it so, would very decidedly not double the value of capital. For no one, however low his impatience, would be willing to give more than 100 in present goods for 120 of next year’s goods when the labor necessary to produce the present 100 would be sufficient to produce the deferred 120. It is true that such an increase of productivity as we have assumed might, when it had greatly increased wealth, tend to reduce impatience and therefore, eventually, to make possible an extension of indirect production to where the marginal product of waiting was a smaller amount than before. But unless and until it did this, the greater productivity could not possibly result in a decrease of the rate of interest. And it is certainly not true that a theory which asserts productivity to be an independent, direct cause and determinant of interest must assume a rate of interest in its premises and so involves a begging of the question. It starts with a rate of interest only in the sense that

¹ Fisher, *The Rate of Interest*, p. 16.

² If the surplus marginal product is 10, the total marginal product of capital is 110. To double this would make it 220, increasing the surplus marginal product, or the marginal product of waiting, to 120.

it starts with a rate of productivity which in large part determines the rate of interest. Even the productivity theorist who asserts, flatly, that interest will be 20 per cent if a capital of 100 produces on the average, at the end of a year, an income of 120, tho his analysis may be incomplete, is not, perhaps, fundamentally in error. For it is not necessarily true that a person values his capital at 100 only because, having an impatience of 20 per cent, he discounts the expected income at a 20 per cent rate. On the contrary, he values his capital at 100 because the amount of labor necessary to produce it, *i. e.*, necessary to get a final result a year later, of 120, is just equal to the amount of labor necessary to get 100 right away. He does not value the capital at more than that, *i. e.*, will not give more than that for it, because he has the option of always being able to get it at that price or value in terms of labor. The sum 100 may properly be called its cost of production. In this sense it is fair to say that interest is 20 per cent if and because a capital of 100 will produce income, at the end of a year, of 120, or will produce 20 a year. We may say that a person's valuation of capital, along with the valuations of other persons in like situation, is less the direct result of a previously existing market rate of interest, than it is, by affecting his and their attitude towards the market, a determinant of the rate of interest.

We are prepared, now, to see also the importance of a distinction which Professor Seager has recently emphasized,¹ between land and made capital, between original natural resources and "the produced means to further production." Land is already present. For the most part there is no balancing of choice as to

¹ The Impatience Theory of Interest, *American Economic Review*, December, 1912, p. 846.

whether or not we shall produce it. Its value depends upon its expected future benefits and the rate of interest or impatience at which they are discounted. But there is the option, during any period, of producing more or less of other capital, turning towards or away from roundabout production. The value of this other capital is just as much dependent upon its cost of production, in the sense above explained, as upon any independently existing rate or rates of impatience. The possibility of getting a larger product of labor, a surplus over the reward of direct production, by applying that labor indirectly, with, as an intermediate step, the use of "produced means to further production," will tend to prevent enterprisers and others from accepting any less surplus as interest on loans or on purchase of goods already produced. This possibility will therefore, in so far, tend to fix the rate of interest and of discount. Does not the view here presented explain the high rates of interest often realized in new countries, quite as well as the impatience theory? ¹ Where natural resources are abundant and accumulations small, the marginal productivity of capital or of waiting is high, and interest is also high.

Does impatience then enter nowhere into the chain of cause and effect? It does enter, but, in the connection to be now emphasized, as effect rather than cause. The marginal productivity of waiting, if 10 per cent regardless of extension, will directly influence supply of and demand for present goods in such a way that, at any lower interest rate than 10 per cent, supply will fall short of demand. It is also true that a marginal productivity of waiting, of 10 per cent, will cause rates of impatience to be correspondingly high. The

¹ See Illustrations in Fisher, *The Rate of Interest*, pp. 304-311 given as inductive verification of the impatience theory.

supply of and demand for present goods, and hence the rate of interest, is one chain of effects following from the marginal productivity of waiting. The comparative deprivation of the present and endowment of the future and the consequent high rate of impatience, constitute another chain of effects. We are here dealing with common effects of a joint cause, not with a single chain of causation.

SECTION 4

On the other hand, still assuming a marginal product of waiting equal to 10 per cent, and assuming now that it does not become greater than that even with indefinite decrease of roundabout production; then at a higher rate of interest than 10 per cent, we should expect to find demand for present goods less than supply. If the rate of interest were 15 per cent, that is if the price of present goods in terms of future were 115, comparatively few persons would be willing to buy present goods. Why offer 115 of next year's goods for 100 of this year's when 100 of this year's can be produced by the direct method in the same time that it takes to produce only 110 of next year's. There might be persons of spendthrift habits and no trustworthiness who would be willing to promise almost any price in future goods in order to get 100 in present goods. But such persons could not be relied on to pay the price and, therefore, are not really in the market. They have a desire rather than a demand. There might be a real demand for present goods at a 15 per cent rate from persons of spendthrift proclivities who, by past accumulations or by inheritance of capital, possessed the means to pay. But such persons would soon eliminate themselves as factors in the problem, and even while they

were in the market, conditions of supply would keep interest down to about 10 per cent. The great mass of consumers would not be in a position to give, as a rule, more than 10 per cent. Most of them are wage earners and in many cases they have little security to offer. *They buy present goods, in effect, with the future goods their labor produces.* That is their chief and in many cases their only means of purchase. If the same labor, which produces 110 of next year's goods by the indirect method, would produce directly 100 of this year's, they would not bid for the 100, an amount equal to 115 of the goods available a year later. Rather than do this, they would seek employment producing directly this year's goods and so avoid the 15 per cent interest.

Looking at the matter from the supply side, we may say that a rate of interest of 15 per cent when the marginal product of waiting is 10 per cent, would almost certainly result in a supply of present goods in excess of the demand. For no one would produce 110 of next year's goods, however little impatient he might be, so long as he could produce with the same labor, 100 of present goods and sell them for 115 of next year's. No one would hire labor to produce 110 of next year's goods when for the same wages he could hire them to produce 100 of this year's and could sell this 100 for 115 of next year's. In short, at a rate of interest of 15 per cent, the supply of present goods would exceed the demand, by the turning of quantities of labor from indirect to direct production, until the large amount of early income and the scarcity of future income, lowered interest and impatience to 10 per cent. The influence of supply would keep interest as low as 10 per cent for all those able to give security and therefore really in the market, unless mankind were so little

thrifty that no amount of turning production to the direct method, no possible stocking of the present and deprivation of the future, could keep their impatience down to 10 per cent, the assumed productivity of waiting. In such a world or such a community, there soon would be no indirect or capitalistic production, but a mere living from hand to mouth; and there could be no loans except the so-called unproductive loans.

We may conclude, therefore, that by acting on the supply of present goods and the demand for them, the superiority of roundabout production tends to keep interest down to as well as up to the marginal productivity of waiting. Interest to those really in the market (because able to give security), cannot go above this per cent so long as a community is thrifty enough to use any degree of indirect production, and is therefore able to increase present goods and decrease future by turning more largely toward direct production. And it cannot go below this, so long as a community has still not reached an impassible limit of indirect production but is yet able to turn more labor toward indirect production or to make the method of production still more roundabout, — to increase either the amount or the time, of waiting.

Assuming, therefore, a constant marginal productivity of waiting, equal to 10 per cent, and a rate of impatience affected by the shape of the income stream, this rate of impatience, as well as the rate of interest, will adjust itself to the rate of productivity of waiting. On the other hand, were we to assume a constant natural rate of impatience regardless of changes in the income stream, and at the same time a productivity of waiting decreasing with the extension of indirect production, *then the marginal productivity and the rate*

of interest would adjust themselves to the impatience. In practice, doubtless adjustment takes place both in marginal productivity of waiting and in impatience, but the influence of productivity has, it is believed, an importance which we are not likely to over-emphasize.

SECTION 5

In a modern community production is capitalistic to a great degree. It would be possible to make it capitalistic to an indefinitely greater degree with continuing gain in productiveness. We are little interested in the theory of how interest might be fixed in a community where the general rate of impatience is too high to permit any accumulation at all, or in a world where further extension of indirect production is impossible. In our existing civilization, the fact that capitalistic production could be much further extended, with, for a long time at least, a surplus gain, is of tremendous importance. It means that no amount of accumulation can be expected to reduce the rate of interest to zero.¹ It means that the marginal product of waiting is one of the most important factors in fixing the rate of interest, worthy of the emphasis which the marginal productivity theorists have given to it, and that any theory which does not give large emphasis to this determining influence acting simultaneously on impatience and interest is either inadequate or misleading or both. It means that if the productivity of waiting were a given per cent regardless of an indefinite subtraction from or addition to the supply of waiting, then that productivity would, in a modern civilized community, fix both interest and impatience at its own exact per cent. It means, in short, that im-

¹ Cassel, *The Nature and Necessity of Interest*, pp. 156, 157.

patience is not the fundamental cause of modern interest nor even a cause through which all other causes must operate, but that it is one of two coördinate causes and is also to some extent a joint consequence, with interest, of the other cause, the superiority of indirect production.

It may be worth while again to emphasize, in conclusion, the importance of a correct use in this connection of the terms "supply" and "demand." Marginal productivity is not to be looked upon as having to do chiefly with demand nor is impatience to be regarded merely as putting a limitation on supply. Neither is it correct to regard productivity merely as an explanation of why interest can be paid and impatience as a reason why it must be.¹ As we have seen, the marginal productivity of waiting *determines the supply of present goods, in the proper sense of "supply," quite as much as it determines the demand*; and impatience, so far as it operates as an independent cause, affects the demand of those who desire present goods as well as the supply offered by those willing to take future goods.

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¹ This seems to be the mode of treatment adopted in Ely, *Outlines of Economics*, New York (Macmillan), 1908, pp. 418, 419.